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The Microfossils in a Pre-Kansan Peat Deposit Near Belle Plaine, Iowa

L. R. Wilson and R. M. Kosanke

Interglacial deposits containing plant remains have been known for a number of years, however few of these have been critically examined by paleobotanists. Early studies of this nature dealt entirely with macroscopic plant remains, but since the development of micropaleontology, these deposits can be further studied and interglacial peats and silts can be examined for pollen and spores and made to produce extensive assemblages of fossils. In the Middlewest there exists but a single previously published paper dealing with plant microfossils of Pre-Kansan peat. This work was done by Nielsen[1] in southeastern Minnesota. In addition to examining the wood fragments which proved to be *Picea* and *Larix,* a study was made of the peat pollens and spores. He records species of *Picea, Abies, Betulaceae, Acer rubrum, Lycopodium complanatum, L. lucidulum, Juglans* or *Carya, Prunus* (?), and *Juniperus* or *Larix*. The two last mentioned genera may not be correctly identified since it is doubtful that pollens of these forms exists as fossils in peat. Such an assemblage of plants as recorded by Nielsen would suggest a forest of greater complexity than has been indicated by younger interglacial plant deposits.

In 1937 a portion of U. S. Highway 30, near Belle Plaine, Iowa, was rerouted and extensive cuts were made through Nebraskan and Kansan glacial drifts. Lying between the two drifts were found several exposures of Aftonian peat. These probably represent a single deposit. The location of this deposit is in the southwestern portion of York Township, in Tama County, Iowa. The locality at which collections were made is 4.9 miles west of the county line on U. S. Highway 30. The peat layer at the best exposure was approximately six inches thick, and collections were made through this at two inch intervals. The top-most collection

[1] Nielsen, E. L. A study of a Pre-Kansan peat deposit. Torreya 35: 53–56: 1935.

was made in direct contact with the Kansan drift and the bottom collection in contact with the mineral soil of Nebraskan age.

The methods employed in preparing the peat for examination are as follows: The dried peat was broken down by crumbling and boiling it in water until dispersed. Then several cubic centimeters of 10 percent ammonium hydroxide was added and the liquid was thoroughly stirred. This was passed through a one millimeter mesh screen and the liquid was allowed to settle. After decanting, the liquid was again stirred and temporary microscopic mounts made. These were studied under a microscope using a 15× ocular and a 3 millimeter objective. The slides were controlled and systematically examined with a mechanical stage.

Plant microfossils were fairly abundant and one hundred and fifty from each level were counted and percentages computed for the various species. In Table 1 are listed the percentages. These

TABLE 1. Percentages of microfossils in a Pre-Kansan peat deposit near Belle Plaine, Iowa

	Depth in Inches from Upper Contact			
	6	*4*	*2*	*0*
Species	*Percents*			
Sphagnum	0.0	5.3	59.5	0.0
Pinus Strobus and *P. resinosa*	9.0	20.0	8.9	9.3
P. Banksiana	0.0	0.0	0.0	1.3
Picea glauca	31.8	12.3	4.6	44.0
P. mariana	18.5	0.0	3.0	18.0
Abies balsamea	4.5	6.1	0.0	10.6
Gramineae	22.7	24.6	.7	2.6
Cyperaceae	0.0	10.0	5.3	2.6
Betula sp.	4.5	.7	4.1	6.6
Quercus sp.	4.5	11.4	2.0	2.6
Acer sp.	0.0	0.0	5.3	0.0
Tilia sp.	0.0	0.0	1.3	0.0
Compositae	4.5	9.6	5.3	2.6

are computed from all of the recognized fossils that occurred in the samples. Figure 1 shows graphically the percentages of tree-pollens. These were computed exclusive of the moss spores and herbaceous pollens. An examination of the species recorded in Table 1 indicates that like the fossil floral assemblage in Minnesota, it is one of considerable complexity. If one compares the two assemblages, they are found to be strikingly similar. The

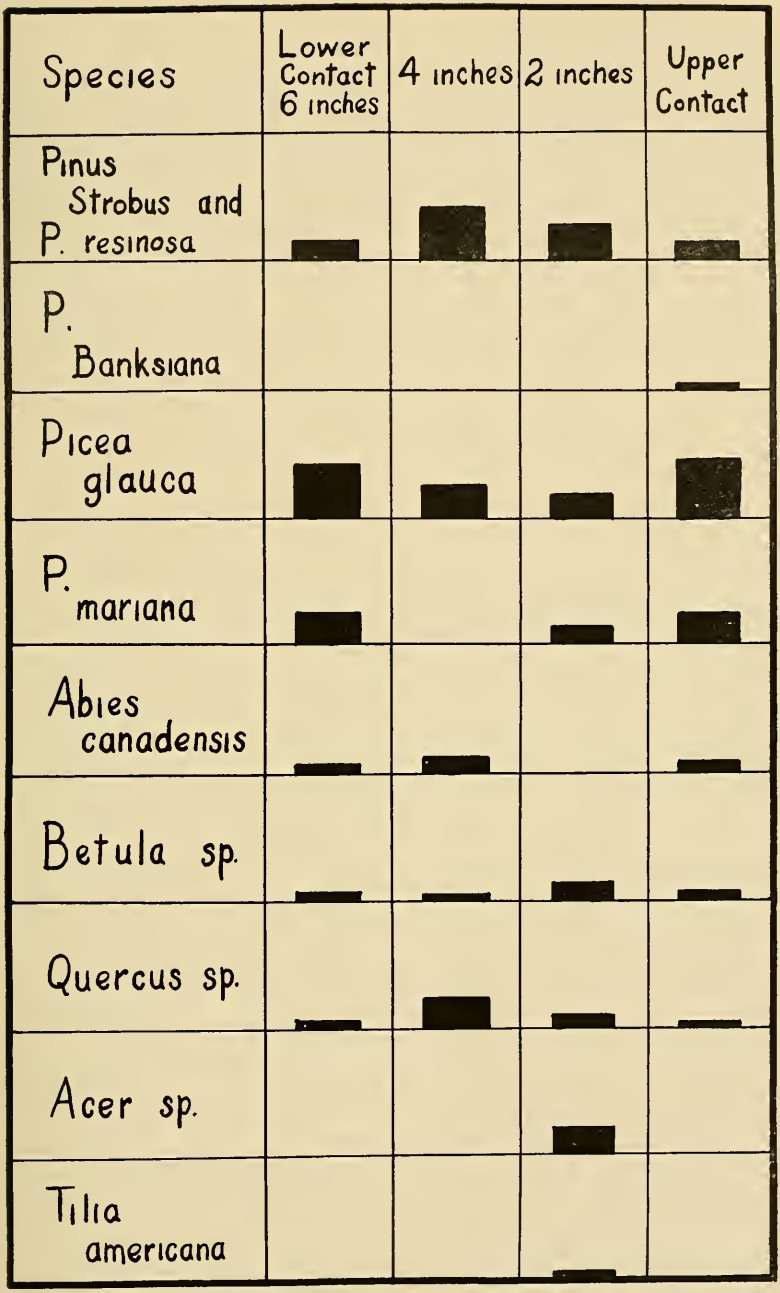

FIGURE 1. Graphs showing percentages of tree-pollens in a Pre-Kansan peat deposit near Belle Plaine, Iowa. The height of each rectangle represents eighty percent.

absence of *Juglans* or *Carya* in the Iowan deposit may be significant, but the presence of *Tilia, Quercus,* and Compositae species in the later deposit may be taken to represent an ecology similar to that suggested by *Juglans* or *Carya.* The assemblages of fossils suggest a forest of the transitional type which exists between the northern coniferous forest and the more southern broad-leaf forest of today. The fossil assemblages in both peat beds suggest a forest type that no longer exists within the immediate vicinities of the deposits.

The graphs (Fig. 1) show that the early forest which developed on the Nebraskan drift, and indicated by the fossils in the six inch level of the peat bed, was that of *Picea, Pinus,* and *Abies* type. In addition, a small percentage of *Betula* and *Quercus* existed. Two inches above the lower contact (4 inch level), *Picea glauca* pollen is less abundant and *Picea mariana* was not found. *Abies* and *Pinus Strobus* or *P. resinosa* are more abundant than in the lowest level, and *Quercus* has increased in importance. In the two inch level, *Picea glauca* continues to decrease while *P. mariana* returns to a place of importance in the pollen diagram. *Betula* increases but *Quercus* is less important and *Acer* and *Tilia* appear for the first time. *Abies* is absent from this level. With the exception of one additional species (*Pinus Banksiana*), the percentages of pollens at the contact of the peat and the Kansan drift is almost identical with those at the contact of the peat and the Nebraskan drift. The return of the tree-pollen percentages at the top of the deposit, to ones similar to those at the lower contact, is suggestive of a return of forest conditions like those in early Aftonian time. Such appears to have been the status of the forest near Belle Plaine, Iowa, when it was overridden by the Kansan Ice. The pollen percentages at the upper contact also suggest that as the ice advanced into central Iowa, there was a change from a broad-leaved and coniferous forest, as suggested in the two inch level, to a more general coniferous forest, indicated by the microfossils at the upper contact.

A detail in the development of the peat is indicated by the presence of *Sphagnum* spores. In Table 1 these are shown to range in abundance from zero percent in the lowest level, to 5.3 percent in the four inch level, and 59.5 percent in the two inch level, and finally back to zero in the uppermost level. These percentages suggest a development of a small pond into a bog. No macroscopic remains of

Sphagnum were found in the peat, but in the upper levels a few partially macerated cells of *Drepanocladus* mosses were observed. That the early sediments were deposited in an aquatic environment is further shown by the presence of sponge spicules and protozoan tests. Except for sponge spicules of the *Spongilla* type, and *Diflugia* tests no animal fossils were observed.

Coe College,
Cedar Rapids, Iowa.

New Plant Records for West Virginia*

Earl L. Core

Since the publication of Strausbaugh and Core's additions (1) to the Millspaugh check-list of the West Virginia flora (2) numerous new species have come to light through continued botanical explorations and herbarium studies. Additional information concerning the distribution of certain plants previously reported has been accumulated and, pending the completion of a revision of the Millspaugh check-list, now under way, it is felt that workers might welcome publication of these data.

Abies balsamea Miller. Millspaugh (3) originally referred the West Virginia blister pine to *A. balsamea* Miller. However, its characters did not seem to match exactly those of that species and he later (4) decided that the West Virginia plants belonged rather to *A. Fraseri* (Pursh) Lindl. A. B. Brooks, in his *West Virginia Trees,* also discussed this species under *A. Fraseri* (5). Core pointed out the doubtful nature of this determination (6) and Wherry (7) pronounced the plant as apparently the intermediate between the two species, named by Fernald *A. balsamea* var. *phanerolepis* (8). Fulling described a similar plant from the Blue Ridge Mountains of Virginia as *A. intermedia* (9). To one conservative enough to believe that binomials are sufficient for the ordinary individual, there is now no question but that the West Virginia plant may be correctly named *A. balsamea.*

The discovery, in May, 1938, of this tree near Stony River Dam, in Grant County, by Maurice Brooks and I. B. Boggs, brings

* Contribution No. 7 from the Herbarium of West Virginia University.